



## UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

## NOTICE OF ALLOWANCE AND FEE(S) DUE

22850

7590

06/16/2008

OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C.  
1940 DUKE STREET  
ALEXANDRIA, VA 22314

EXAMINER

BROOME, SAID A

ART UNIT

PAPER NUMBER

2628

DATE MAILED: 06/16/2008

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/649,697	08/28/2003	Satoru Ohishi	242158/US35	6746

TITLE OF INVENTION: 3D IMAGE PROCESSING APPARATUS

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1440	\$300	\$0	\$1740	09/16/2008

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. **PROSECUTION ON THE MERITS IS CLOSED.** THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN **THREE MONTHS** FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. **THIS STATUTORY PERIOD CANNOT BE EXTENDED.** SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

## HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

**IMPORTANT REMINDER:** Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

# **PART B - FEE(S) TRANSMITTAL**

**Complete and send this form, together with applicable fee(s), to:** **Mail** **Mail Stop ISSUE FEE**  
**Commissioner for Patents**  
**P.O. Box 1450**  
**Alexandria, Virginia 22313-1450**  
**or Fax** **(571)-273-2885**

**INSTRUCTIONS:** This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

22850 7590 06/16/2008

**OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C.**  
**1940 DUKE STREET**  
**ALEXANDRIA, VA 22314**

## **Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/649,697	08/28/2003	Satoru Ohishi	242158U/S3S	6746

TITLE OF INVENTION: 3D IMAGE PROCESSING APPARATUS

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1440	\$300	\$0	\$1740	09/16/2008

EXAMINER	ART UNIT	CLASS-SUBCLASS
BROOME, SAID A	2628	345-419000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.  
☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a **Customer Number is required.**

2. For printing on the patent front page, list

- (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, 1 \_\_\_\_\_  
(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 \_\_\_\_\_  
3 \_\_\_\_\_

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☐ Issue Fee  
☐ Publication Fee (No small entity discount permitted)  
☐ Advance Order - # of Copies \_\_\_\_\_

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.  
☐ Payment by credit card. Form PTO-2038 is attached.  
☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number \_\_\_\_\_ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature \_\_\_\_\_ Date \_\_\_\_\_  
Typed or printed name \_\_\_\_\_ Registration No. \_\_\_\_\_

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/649,697

08/28/2003

Satoru Ohishi

2421581US3S

6746

22850

7590

06/16/2008

EXAMINER

BROOME, SAID A

ART UNIT

PAPER NUMBER

2628

DATE MAILED: 06/16/2008

OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C.  
1940 DUKE STREET  
ALEXANDRIA, VA 22314

## Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 94 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 94 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

**Notice of Allowability****Application No.**

10/649,697

**Applicant(s)**

OHISHI, SATORU

**Examiner**

SAID BROOME

**Art Unit**

2628

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to amendment filed 3/17/08.
2. ☒ The allowed claim(s) is/are 23-30.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some\* c) ☐ None of the:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.  
(a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached  
1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.  
(b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.  
**Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08),  
Paper No./Mail Date \_\_\_\_\_
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413),  
Paper No./Mail Date \_\_\_\_\_
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other \_\_\_\_\_.

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(c), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(c) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3/17/08 has been entered.

### ***Response to Amendment***

1. This office action is in response to an amendment filed on 3/17/2008.
2. Claims 23-30 have been added by the applicant.
3. Claims 1-22 have been cancelled.

### ***Allowable Subject Matter***

Claims 23-30 are allowed. The following is an examiner's statement of reasons for allowance:

In regards to claim 23, the prior art, Strobel (US Patent 6,650,724), Mullick et al. (US Patent 7,123,760), Buzug et al. (US Patent 5,956,435) and Klotz et al. (US Patent 6,845,142), fail to teach an image synthesizing unit configured to generate a synthesis of two of the surface rendered digital images, a display unit configured to display the synthesized digital images, and an input device configured to be used by an operator to select one of three modes of 3D image processing on the object, the apparatus configured

Art Unit: 2628

to operate according to this selection, such that in the first mode: mask and contrast images are input and subtracted by the subtraction unit to generate digital subtraction images which are separately processed by the reconstruction unit to generate 3D digital mask and subtraction images, which are then separately processed by the image processing unit to generate surface rendered digital mask and subtraction images, which are then synthesized by the image synthesizing unit into a combined 3D digital image which is displayed on the display unit, in the second mode: mask and contrast images are input and separately processed by the reconstruction unit to generate 3D digital mask and contrast images which are then subtracted by the subtraction unit to generate 3D digital subtraction images, the 3D digital mask and subtraction images then being separately processed by the image processing unit to generate surface rendered digital mask and subtraction images, which are then synthesized by the image synthesizing unit into a combined 3D digital image which is displayed on the display unit, and in the third mode: mask and contrast images are subtracted in the subtraction unit to generate digital subtraction images viewed from the plurality of projection directions, then the digital subtraction images and the digital contrast images are separately processed by the reconstruction unit to generate 3D digital contrast and subtraction images, which are then subtracted from each other in the subtraction unit to generate 3D digital mask images, the 3D digital mask and subtraction images then being separately processed by the reconstruction unit to generate 3D digital mask and subtraction images, which are then separately processed by the image processing unit to generate surface rendered digital mask and subtraction images, which are then

Art Unit: 2628

synthesized by the image synthesizing unit into a combined 3D digital image which is displayed on the display unit, therefore claims 23 and 27-30 are allowable.

In regards to claim 24, the prior art Strobel (US Patent 6,650,724), Mullick et al. (US Patent 7,123,760), Buzug et al. (US Patent 5,956,435) and Klotz et al. (US Patent 6,845,142), fail to teach an image processing unit configured to carry out surface rendering processing of the 3D digital images to generate surface rendered digital images for display, an image synthesizing unit configured to generate a synthesis of two of the surface rendered digital images, a display unit configured to display the synthesized digital images, the apparatus being arranged such that mask and contrast images are input and separately processed by the reconstruction unit to generate 3D digital mask and contrast images which are then subtracted by the subtraction unit to generate 3D digital subtraction images, the 3D digital mask and subtraction images then being separately processed by the image processing unit to generate surface rendered digital mask and subtraction images, which are then synthesized by the image synthesizing unit into a combined 3D digital image which is displayed on the display unit, therefore claims 24 and 27-30 are allowable.

In regards to claim 25, the prior art Strobel (US Patent 6,650,724), Mullick et al. (US Patent 7,123,760), Buzug et al. (US Patent 5,956,435) and Klotz et al. (US Patent 6,845,142), fail to teach an image processing unit configured to carry out surface rendering processing of the 3D digital images to generate surface rendered digital images for display, an image synthesizing unit configured to generate a synthesis of two of the surface rendered digital images, a display unit configured to display the synthesized digital images, the apparatus being arranged such that mask and contrast images are

Art Unit: 2628

subtracted in the subtraction unit to generate digital subtraction images viewed from the plurality of projection directions, then the digital subtraction images and the digital contrast images are separately processed by the reconstruction unit to generate 3D digital contrast and subtraction images, which are then subtracted from each other in the subtraction unit to generate 3D digital mask images, the 3D digital mask and subtraction images then being separately processed by the reconstruction unit to generate 3D digital mask and subtraction images, which are then separately processed by the image processing unit to generate surface rendered digital mask and subtraction images, which are then synthesized by the image synthesizing unit into a combined 3D digital image which is displayed on the display unit, therefore claims 25 and 27-30 are allowable.

In regards to claim 26, the prior art Strobel (US Patent 6,650,724), Mullick et al. (US Patent 7,123,760), Buzug et al. (US Patent 5,956,435) and Klotz et al. (US Patent 6,845,142), fail to teach an image processing unit configured to carry out surface rendering processing of the 3D digital images to generate surface rendered digital images for display, an image synthesizing unit configured to generate a synthesis of two of the surface rendered digital images, a display unit configured to display the synthesized digital images, and a distortion correction unit with a stored distortion distribution table containing correction vectors for use by the distortion correction unit to correct the mask and contrast images for pincushion distortion and sigmoid distortion, the apparatus being configured to acquire the mask and contrast images and to correct them in the distortion correction unit, and then either: mask and contrast images are subtracted in the subtraction unit to generate digital subtraction images viewed from the plurality of projection directions, then the digital subtraction images and the digital contrast images



Art Unit: 2628

are separately processed by the reconstruction unit to generate 3D digital contrast and subtraction images, which are then subtracted from each other in the subtraction unit to generate 3D digital mask images, the 3D digital mask and subtraction images then being separately processed by the reconstruction unit to generate 3D digital mask and subtraction images, which are then separately processed by the image processing unit to generate surface rendered digital mask and subtraction images, which are then synthesized by the image synthesizing unit into a combined 3D digital image which is displayed on the display unit, or mask and contrast images are input and separately processed by the reconstruction unit to generate 3D digital mask and contrast images which are then subtracted by the subtraction unit to generate 3D digital subtraction images, the 3D digital mask and subtraction images then being separately processed by the image processing unit to generate surface rendered digital mask and subtraction images, which are then synthesized by the image synthesizing unit into a combined 3D digital image which is displayed on the display unit, or mask and contrast images are subtracted in the subtraction unit to generate digital subtraction images viewed from the plurality of projection directions, then the digital subtraction images and the digital contrast images are separately processed by the reconstruction unit to generate 3D digital contrast and subtraction images, which are then subtracted from each other in the subtraction unit to generate 3D digital mask images, the 3D digital mask and subtraction images then being separately processed by the reconstruction unit to generate 3D digital mask and subtraction images, which are then separately processed by the image processing unit to generate surface rendered digital mask and subtraction images, which

Art Unit: 2628

are then synthesized by the image synthesizing unit into a combined 3D digital image which is displayed on the display unit, therefore claims 26-30 are allowable.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Response to Arguments***

Applicant's arguments, filed 3/17/08, with respect to claims 1-22 have been fully considered and are persuasive. The rejection of claims 1-22 under 35 U.S.C. 103(a) in view of the prior art has been withdrawn due to the addition of new claims 23-30.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The prior art United States patents on the attached PTO-892 form pertain to 3D digital image subtraction:

- Liou et al. US 5,839,440
- Foo et al. US 6,493,569

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SAID BROOME whose telephone number is (571)272-2931. The examiner can normally be reached on M-F 8:30am-5pm.

Art Unit: 2628

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka Chauhan can be reached on (571)272-7782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Ulka Chauhan/  
Supervisory Patent Examiner, Art Unit 2628

/Said Broome/  
Examiner, Art Unit 2628